Medial Wall Fracture and Orbital Emphysema Mimicking Inferior Rectus Entrapment in a Child

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Abstract

Orbital emphysema is commonly associated with fractures of the orbital floor or medial wall. The air often dissipates spontaneously, but rarely can cause increased intraocular pressure and even loss of vision. Entrapment of the extraocular muscles can also occur with orbital fractures and may require prompt treatment in the pediatric patient due to the risk muscle ischemia. Both conditions can cause diplopia due to restriction of eye movement and differentiation of the two etiologies is important to prevent unnecessary surgical exploration. Identification and prompt management of raised intraocular pressure is essential in patients with orbital trauma. We present a case of orbital emphysema mimicking inferior rectus entrapment following trauma in an 11-year-old boy.

Keywords

- orbital trauma
- ophthalmology
- pediatric

Orbital emphysema is detected radiologically in approximately 50% of orbital fractures.¹ It predominantly occurs with medial orbital wall fractures and is exacerbated by sneezing and nose blowing.² Emphysema can also be associated with orbital infections or tumors.³ In trauma, orbital emphysema occurs when fracture of bone between the paranasal air sinuses and orbit is associated with a tear in the sinus mucosa establishing a sino-orbital connection. Air is then transmitted to the orbit when the intranasal pressure is raised during sneezing or nose blowing. The air can subsequently become trapped if the orbital fat acts as a one-way valve over the fracture, particularly with smaller fractures.⁴

The orbit is an enclosed space and tolerates rises in pressure poorly. The only compensatory mechanism is proptosis of the eye, which is limited. This means that while the majority of cases of orbital emphysema are only detectable radiologically, severe cases can cause restricted eye movement, acute compartment syndrome with raised intraocular pressure, central retinal artery occlusion, and loss of vision.^{3,5} In severe cases, needle decompression of trapped orbital air or lateral canthotomy and cantholysis may be indicated.^{6,7} Needle decompression should be undertaken with caution

due to the risks of retrobulbar hemorrhage, scleral perforation, and optic nerve damage.³ Two cases of orbital emphysema mimicking inferior rectus entrapment in adults have been reported recently where the collection of air splinted the superior rectus muscle.⁸ We present the first description of this condition in a pediatric patient.

Case Report

An 11-year-old boy presented with his father to the Eye Casualty Department complaining of double vision. He had been playing rugby and suffered a blow to his right eye from an opponent's knee. His vision was initially blurred, but this resolved after 5 minutes. On his way home from the match, he blew his nose and experienced sudden swelling of the right upper eyelid and diplopia.

Examination showed a swollen, nonerythematous right upper eyelid with mild proptosis and significant hypoglobus of the right globe. No hypotropia was identified. Visual acuity was 6/24 in the right eye, improving to 6/6 with a pinhole. Visual acuity in the left eye was 6/5. There was conjunctival chemosis of the right eye and the intraocular pressure was

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elevated at 38 mm Hg. Funduscopy revealed commotio of the nasal retina. No abnormalities of the anterior segments, optic discs, pupillary light reflexes, or color vision were detected. There was significant restriction of elevation and adduction of the right globe. These findings led to a clinical diagnosis of right orbital floor fracture with entrapment of the inferior rectus muscle.

Computed tomography, however, demonstrated a fracture of the right lamina papyracea and a large volume of air within the right orbit, but an intact orbital floor (► Figs. 1–3). It was therefore deduced that the emphysema was restricting the action of the superior rectus. In view of the increased intraocular pressure, the patient was admitted and commenced on oral acetazolamide 250 mg qid, topical guttae apraclonidine tid, and oral co-amoxiclav 375 mg tid. He was regularly reviewed and his optic nerve function and intraocular pressures were monitored. There was little improvement in the movement of the right eye; therefore, the following day, a forced duction was performed under local anesthetic and no entrapment was detected. Visual acuity returned to 6/5 and normalization of intraocular pressure and eye movement continued without further intervention.

Discussion

Orbital floor fracture with inferior rectus entrapment can require prompt surgical treatment in pediatric patients due to the risk of muscle necrosis and permanent restriction of gaze. The elastic properties of juvenile bone means that trap-door type fractures are more likely to entrap muscle and yet are often more difficult to visualize radiologically. This case highlights the value of an ophthalmology assessment for injuries of this type, both to avoid unnecessary surgical exploration and to manage raised intraocular pressures. Maxillofacial surgeons should be aware of orbital emphysema as a cause of restricted eye movement following naso-orbital trauma and the importance of measuring intraocular pressures in these patients.

Fig. 1 Sagittal CT demonstrating air in superior orbit.

Fig. 2 Coronal CT demonstrating emphysema, medial wall fracture, and intact orbital floor.

Fig. 3 Axial CT demonstrating emphysema and medial wall fracture.

Conflict of Interest

None.

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